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28875   7590   07/14/2008

Zilka-Kotab, PC
P.O. BOX 721120
SAN JOSE, CA 95172-1120

EXAMINER
GUILL, RUSSELL L

ART UNIT	PAPER NUMBER
2123	

DATE MAILED: 07/14/2008

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/099,721	03/14/2002	Gregory E. James	NVIDP074/P000427	1906

TITLE OF INVENTION: SYSTEM AND METHOD FOR CALCULATING PARTIAL DIFFERENTIAL EQUATIONS IN A HARDWARE GRAPHICS PIPELINE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1440	$0	$0	$1440	10/14/2008

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: <u>Mail</u>

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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

_____ (Depositor's name)

_____ (Signature)

_____ (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/099,721	03/14/2002	Gregory E. James	NVIDP074/P000427	1906

TITLE OF INVENTION: SYSTEM AND METHOD FOR CALCULATING PARTIAL DIFFERENTIAL EQUATIONS IN A HARDWARE GRAPHICS PIPELINE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1440	$0	$0	$1440	10/14/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
GUILL, RUSSELL L	2123	703-002000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE   (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) :   ☐ Individual   ☐ Corporation or other private group entity   ☐ Government

4a. The following fee(s) are submitted:

☐ Issue Fee

☐ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)

☐ A check is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____   Date _____

Typed or printed name _____   Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/099,721	03/14/2002	Gregory E. James	NVIDP074/P000427	1906

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EXAMINER
GUILL, RUSSELL L

ART UNIT	PAPER NUMBER
2123	

DATE MAILED: 07/14/2008

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 833 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 833 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

	Application No.	**Applicant(s)**
Notice of Allowability	10/099,721	JAMES, GREGORY E.
	Examiner	**Art Unit**	
	Russ Guill	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *4/7/2008*.

2. ☒ The allowed claim(s) is/are *1,2,4,5,7-15,17,18,21-31,34 and 35*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None of the:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the

            International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of

        Paper No./Mail Date _____.

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application

6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____.

EXAMINERS AMENDMENT

1. The Examiner would like to thank the Applicant for the very well prepared amendments during the examination process. The Examiner appreciates the effort to carefully analyze the Office actions and make well prepared arguments and amendments.

2. An Examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to the applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

3. Authorization for this amendment was given in a telephone interview with Kevin Zilka on June 24, 2008.

4. The claims have been amended as follows:

    a. Claim 26, line 2, the words "pipeline for processing" have been replaced with the words --pipeline processing--.

    b. Claim 27, line 14, the word "include" is replaced with the word --includes--.

    c. Claim 31, line 6, the words "the_determining" have been replaced with the words --the determining--.

Allowable Subject Matter

5. Claims 1 – 2, 4 – 5, 7 – 15, 17 – 18, 21 – 31 and 34 - 35 are allowable over the prior art of record.

6. Following is an examiner's statement of reasons for allowance:

7. While Press ("Numerical Recipes in Fortran 77", 2001) teaches receiving input;
processing the input to generate the solution to the partial differential equation; the
processing further includes determining whether the solution has converged; and
Rumpf ("Using Graphics Cards for Quantized FEM Computation") teaches receiving
input in the hardware graphics pipeline; processing the input to generate the solution to
the partial differential equation utilizing the hardware graphics pipeline; generating
output utilizing the hardware graphics pipeline for display; the solution to the partial
differential equation is generated utilizing the hardware graphics pipeline for
enhancing graphics processing operations performed by the hardware graphics
pipeline; the graphics processing operations performed by the hardware graphics
pipeline are enhanced by determining a location of surfaces or objects for rendering
purposes utilizing the solution to the partial differential equation generated utilizing
the hardware graphics pipeline; the input includes a local area of textures used to
sample a texture map to generate a modified local area of textures; and Burden
("Numerical Analysis") teaches, the determining whether the solution has converged
includes calculating errors (page 403, Jacobi iterative algorithm 7.1, step 4, $x - XO$ is
calculating an error) and concluding that the solution has converged based on the
calculation of the errors (page 403, Jacobi iterative algorithm 7.1, step 4); determining
whether the solution has converged further includes summing *the absolute value of* the
errors and concluding that the solution has converged if the sum of the absolute value
of the errors is less than a predetermined amount (the norm of $x - XO$ is described as
the l_∞ or l_2 norms (page 384) or l_1 norm, page 393, problem 2); determining whether the
solution has converged further includes summing the *square of* the errors and
concluding that the solution has converged if the square root of the sum of the *square of*
the errors is less than a predetermined amount (the norm of $x - XO$ is described as the l_∞

or l_2 norms (page 384) or l_1 norm, page 393, problem 2); and Dongarra ("Stopping Criteria" and "More Details about Stopping Criteria") teaches, the determining whether the solution has converged includes calculating errors ("Stopping Criteria", page 2 of 2, "Compute the residual $r^{(i)} = Ax^{(i)} - b$") and concluding that the solution has converged based on the calculation of the errors ("Stopping Criteria", page 2 of 2, "until i≥maxit or $||r^{(i)}|| \leq$ stop_tol•$(||A|| • ||x^{(i)}|| + ||b||$ "); determining whether the solution has converged further includes summing *the absolute value of* the errors and concluding that the solution has converged if the sum of the absolute value of the errors is less than a predetermined amount (see previous Dongarra citations, plus "More Details about Stopping Criteria", page 1 of 4, defines the norms of $||x||_1$ and $||x||_2$); determining whether the solution has converged further includes summing the *square of* the errors and concluding that the solution has converged if the square root of the sum of the *square of* the errors is less than a predetermined amount (see previous Dongarra citations, plus "More Details about Stopping Criteria", page 1 of 4, defines the norms of $||x||_1$ and $||x||_2$); and Larsen ("Fast Matrix Multiplies Using Graphics Hardware") teaches matrix-matrix multiplies using graphics textures; and Thompson ("Using modern graphics architectures for general-purpose computing: a framework and analysis", 2002) teaches matrix multiplies using a graphics processor; none of these references either alone or in combination with the prior art of record teaches a method and system of generating a solution to a partial differential equation in a hardware graphics pipeline, specifically including:

    a. Regarding claim 1, "wherein the determining whether the solution has converged further includes <u>summing the errors</u>, and concluding that the solution has converged if the sum of errors is less than a predetermined amount", in combination with the remaining features and elements of the claimed invention,

    b. Regarding claim 27, "wherein the determining whether the solution has converged further includes <u>summing the errors</u>, and concluding that the solution

has converged if the sum of errors is less than a predetermined amount", in

combination with the remaining features and elements of the claimed invention.

8.   While Press ("Numerical Recipes in Fortran 77", 2001) teaches receiving input;

processing the input to generate the solution to the partial differential equation; the

processing further includes determining whether the solution has converged; and

Rumpf ("Using Graphics Cards for Quantized FEM Computation") teaches receiving

input in the hardware graphics pipeline; processing the input to generate the solution to

the partial differential equation utilizing the hardware graphics pipeline; generating

output utilizing the hardware graphics pipeline for display; the solution to the partial

differential equation is generated utilizing the hardware graphics pipeline for

enhancing graphics processing operations performed by the hardware graphics

pipeline; the graphics processing operations performed by the hardware graphics

pipeline are enhanced by determining a location of surfaces or objects for rendering

purposes utilizing the solution to the partial differential equation generated utilizing

the hardware graphics pipeline; the input includes a local area of textures; the local area

of textures is filtered utilizing a filter including a plurality of elements; the input

includes a local area of textures used to sample a texture map to generate a modified

local area of textures; and Burden ("Numerical Analysis") teaches, the determining

whether the solution has converged includes calculating errors (page 403, Jacobi

iterative algorithm 7.1, step 4, $x - XO$ is calculating an error) and concluding that the

solution has converged based on the calculation of the errors (page 403, Jacobi iterative

algorithm 7.1, step 4); determining whether the solution has converged further includes

summing *the absolute value of* the errors and concluding that the solution has converged

if the sum of the absolute value of the errors is less than a predetermined amount (the

norm of $x - XO$ is described as the l_∞ or l_2 norms (page 384) or l_1 norm, page 393,

problem 2); determining whether the solution has converged further includes summing the *square of* the errors and concluding that the solution has converged if the square root of the sum of the *square of* the errors is less than a predetermined amount (the norm of x – XO is described as the l_∞ or l_2 norms (page 384) or l_1 norm, page 393, problem 2); and Dongarra ("Stopping Criteria" and "More Details about Stopping Criteria") teaches, the determining whether the solution has converged includes calculating errors ("Stopping Criteria", page 2 of 2, "Compute the residual $r^{(i)} = Ax^{(i)} - b$") and concluding that the solution has converged based on the calculation of the errors ("Stopping Criteria", page 2 of 2, "until i≥maxit or $||r^{(i)}|| \leq$ stop_tol • $(||A|| \bullet ||x^{(i)}|| + ||b||$"); determining whether the solution has converged further includes summing *the absolute value of* the errors and concluding that the solution has converged if the sum of the absolute value of the errors is less than a predetermined amount (see previous Dongarra citations, plus "More Details about Stopping Criteria", page 1 of 4, defines the norms of $||x||_1$ and $||x||_2$); determining whether the solution has converged further includes summing the *square of* the errors and concluding that the solution has converged if the square root of the sum of the *square of* the errors is less than a predetermined amount (see previous Dongarra citations, plus "More Details about Stopping Criteria", page 1 of 4, defines the norms of $||x||_1$ and $||x||_2$); and Larsen ("Fast Matrix Multiplies Using Graphics Hardware") teaches matrix-matrix multiplies using graphics textures; none of these references either alone or in combination with the prior art of record teaches a method and system of generating a solution to a partial differential equation in a hardware graphics pipeline, specifically including:

    a. Regarding claim 10, "wherein the determining whether the solution has converged further includes <u>summing the errors</u>, and concluding that the solution has converged if the sum of errors is less than a predetermined amount", in combination with the remaining features and elements of the claimed invention,

b. Regarding claim 11, "wherein the determining whether the solution has
converged further includes <u>summing the errors</u>, and concluding that the solution
has converged if the sum of errors is less than a predetermined amount", in
combination with the remaining features and elements of the claimed invention.

9. While Press ("Numerical Recipes in C", 1988) teaches receiving input; processing the
input to generate the solution to the partial differential equation; the processing further
includes determining whether the solution has converged; and Rumpf ("Using
Graphics Cards for Quantized FEM Computation") teaches receiving input in the
hardware graphics pipeline; processing the input to generate the solution to the partial
differential equation utilizing the hardware graphics pipeline; generating output
utilizing the hardware graphics pipeline for display; the solution to the partial
differential equation is generated utilizing the hardware graphics pipeline for
enhancing graphics processing operations performed by the hardware graphics
pipeline; the graphics processing operations performed by the hardware graphics
pipeline are enhanced by determining a location of surfaces or objects for rendering
purposes utilizing the solution to the partial differential equation generated utilizing
the hardware graphics pipeline; the input includes a local area of textures used to
sample a texture map to generate a modified local area of textures; and Burden
("Numerical Analysis") teaches, the determining whether the solution has converged
includes calculating errors (page 403, Jacobi iterative algorithm 7.1, step 4, x − XO is
calculating an error) and concluding that the solution has converged based on the
calculation of the errors (page 403, Jacobi iterative algorithm 7.1, step 4); determining
whether the solution has converged further includes summing *the absolute value of* the
errors and concluding that the solution has converged if the sum of the absolute value
of the errors is less than a predetermined amount (the norm of x − XO is described as

the l_∞ or l_2 norms (page 384) or l_1 norm, page 393, problem 2); determining whether the

solution has converged further includes summing the *square of* the errors and

concluding that the solution has converged if the square root of the sum of the *square of*

the errors is less than a predetermined amount (the norm of x – XO is described as the l_∞

or l_2 norms (page 384) or l_1 norm, page 393, problem 2); and Dongarra ("Stopping

Criteria" and "More Details about Stopping Criteria") teaches, the determining whether

the solution has converged includes calculating errors ("Stopping Criteria", page 2 of 2,

"Compute the residual $r^{(i)} = Ax^{(i)} - b$") and concluding that the solution has converged

based on the calculation of the errors ("Stopping Criteria", page 2 of 2, "until i≥maxit or

$||r^{(i)}|| \leq$stop_tol•$(||A|| • ||x^{(i)}|| + ||b||$"); determining whether the solution has

converged further includes summing *the absolute value of* the errors and concluding that

the solution has converged if the sum of the absolute value of the errors is less than a

predetermined amount (see previous Dongarra citations, plus "More Details about

Stopping Criteria", page 1 of 4, defines the norms of $||x||_1$ and $||x||_2$); determining

whether the solution has converged further includes summing the *square of* the errors

and concluding that the solution has converged if the square root of the sum of the

square of the errors is less than a predetermined amount (see previous Dongarra

citations, plus "More Details about Stopping Criteria", page 1 of 4, defines the norms of

$||x||_1$ and $||x||_2$); and Larsen ("Fast Matrix Multiplies Using Graphics Hardware")

teaches matrix-matrix multiplies using graphics textures; none of these references either

alone or in combination with the prior art of record teaches a method and system of

generating a solution to a partial differential equation in a hardware graphics pipeline,

specifically including:

> a. Regarding claim 26, "wherein the determining whether the solution has
>
> converged further includes <u>summing the errors</u>, and concluding that the solution
>
> has converged if the sum of errors is less than a predetermined amount", in
>
> combination with the remaining features and elements of the claimed invention,

b. Regarding claim 28, "wherein the determining whether the solution has converged further includes <u>summing the errors</u>, and concluding that the solution has converged if the sum of errors is less than a predetermined amount", in combination with the remaining features and elements of the claimed invention,

c. Regarding claim 30, "wherein the determining whether the solution has converged further includes <u>summing the errors</u>, and concluding that the solution has converged if the sum of errors is less than a predetermined amount", in combination with the remaining features and elements of the claimed invention,

d. Regarding claim 29, "determining the solution has converged by: ~~calculating errors~~, <u>summing the errors</u>, and concluding that the solution has converged if the sum of errors is less than a predetermined amount", in combination with the remaining features and elements of the claimed invention.

10. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russ Guill whose telephone number is 571-272-7955. The examiner can normally be reached on Monday – Friday 9:30 AM – 6:00 PM.

12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on 571-272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Any

inquiry of a general nature or relating to the status of this application should be directed to the TC2100 Group Receptionist: 571-272-2100.

13. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Russ Guill
Examiner
Art Unit 2123

RG

/Paul L Rodriguez/

Supervisory Patent Examiner,
Art Unit 2123